REMARKS

Applicant appreciates the thorough examination of the present application that is reflected in the Official Action of January 4, 2005. In particular, Applicant appreciates the indication that Claims 11-17 are allowed, and that Claim 5 would be allowable if rewritten in independent form. Claim 5, however, has not been rewritten in independent form because Applicant respectfully submits that independent Claim 1, from which Claim 5 depends, is patentable. Claim 1 has been amended to correct an error therein where "the reference magnetic resistors" was incorrectly recited as "the main magnetic resistors". In addition, Claims 18-25 and 38 have been canceled, and Claim 37 has been amended to include the recitations of Claim 38. No new matter has been added. Accordingly, Applicant respectfully submits that pending Claims 1-17, 26-37, and 39-46 are patentable over the cited references for at least the reasons that now will be described.

Independent Claim 37 Is Patentable Over Hidaka

Claims 18-25, 37, 41, and 43-46 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,754,099 to Hidaka ("Hidaka"). In response, Applicant has canceled Claims 18-25, and amended Claim 37 to include the recitations of Claim 38, which has also been canceled. In particular, Claim 37 as amended recites a plurality of elongated main magnetic resistors and a plurality of elongated reference magnetic resistors "wherein the plurality of elongated main magnetic resistors extend along the face and the plurality of elongated reference magnetic resistors extend along the face nonparallel to the plurality of elongated main magnetic resistors."

As stated in the Official Action, Hidaka discloses an MRAM substrate, a plurality of main cells each with main magnetic resistors, and a plurality of reference cells each with reference magnetic resistors. *See* Office Action, Page 2. However, Applicant submits that Hidaka does not appear to disclose elongated reference magnetic resistors that are nonparallel to elongated main magnetic resistors. In fact, as stated in the Official Action with reference to the §103 rejections, "Hidaka shows most aspects of the instant invention...except for the magnetic resistors, both main and reference, having an elongated shape...and the reference

magnetic resistors extending along the face of the substrate in a nonparallel faction to the main magnetic resistors." Office Action, Page 3 (*Emphasis added*). Accordingly, Applicant submits that amended Claim 37 is patentable over Hidaka for at least the above reasons. Moreover, Applicant respectfully submits that Claim 37 is patentable under 35 U.S.C. §103(a) over Hidaka in view of cited references to Li et al. and Bhattacharyya et al. for at least the reasons that are discussed in the next section of these remarks. Applicant has also amended Claims 39 and 40 to depend from amended Claim 37. As such, dependent Claims 39-46 are patentable over Hidaka, Li, and/or Bhattacharyya at least per the patentability of Claim 37 from which they depend.

Independent Claims 1 and 26 Are Patentable Over the Cited References

Claims 1-3, 6-10, 26-30, 32-36, and 38-40 stand rejected under 35 U.S.C. §103(a) as obvious over Hidaka in view of U.S. Patent No. 6,791,856 to Li et al. ("Li"), and U.S. Patent No. 6,597,049 to Bhattacharyya et al. ("Bhattacharyya"). Claim 26, for example, recites:

> 26. A Magnetic Random Access Memory (MRAM) comprising:
> an MRAM substrate including a face;
> a plurality of elongated main magnetic resistors that extend along the face; and
> a plurality of elongated reference magnetic resistors that extend along the face nonparallel to the plurality of elongated main magnetic resistors. (*Emphasis added*).

As discussed above, the Official Action asserts that Hidaka discloses "most aspects of the instant invention...except for the magnetic resistors, both main and reference, having an elongated shape...and the reference magnetic resistors extending along the face of the substrate in a nonparallel faction to the main magnetic resistors." Office Action, Page 3. The Office Action relies on Bhattacharyya as disclosing magnetic resistors with an elongated shape, and Li as disclosing magnetic resistors that are nonparallel.

However, Applicant submits that none of the cited references, either alone or in combination, discloses "a plurality of elongated reference magnetic resistors that extend along the face nonparallel to the plurality of elongated main magnetic resistors", as recited by Claim 26 (*emphasis added*). Li, for example, describes magnetic resistors (magneto-resistive bits **100a-e**) that are offset relative to digital and word lines on the MRAM substrate. More

particularly, as described in Li:

> The major axis of each of the elongated magneto-resistive bit is preferably parallel to the major axis of all of the other elongated magneto-resistive bits. In the illustrative embodiment shown in FIG. 3, the major axis of each elongated magneto-resistive bit is offset relative to the axes of the elongated digital lines and the axes of the elongated word lines so as to be not parallel with the axes of the elongated digital lines and not perpendicular to the axes of the elongated word lines. For example, the major axis **122** of magneto-resistive bit **100a** is not parallel with the axis of elongated digital line **110a**, and not perpendicular to the axis of elongated word line **108a**.

Li, Col. 7, lines 26-38. Thus, Li describes the orientation of the magneto-resistive bits **100a-e** as parallel relative to each other, and not parallel relative to digital lines and word lines. However, Li does not appear to describe the orientation of the magneto-resistive bits **100a-e** as nonparallel relative to reference magnetic resistors. In fact, Li does not even appear to distinguish between main and reference magnetic transistors. Thus, Applicant submits that Li does not appear to disclose or suggest elongated reference magnetic resistors that are nonparallel to elongated main magnetic resistors. Nor do Hidaka and Bhattacharyya appear to disclose or suggest these recitations. Accordingly, as Hidaka, Li, and Bhattacharyya fail to disclose or suggest all of the recitations of Claim 26, Applicant submits that Claim 26 is patentable over the cited references for at least the above reasons. Claim 1 as amended similarly recites main and reference magnetic resistors having "a length direction of the reference magnetic resistors intersecting a length direction of the main magnetic resistors at a predetermined nonzero angle." As such, Applicant submits that Claim 1 is patentable over the cited references for reasons similar to those discussed above with reference to Claim 26. Moreover, dependent Claims 27-36 and 2-10 are patentable at least per the patentability of Claims 26 and 1 from which they respectively depend.

Many of the Dependent Claims Are Separately Patentable

Claims 4 and 31 also stand rejected under 35 U.S.C. §103(a) as obvious over Hidaka, Li, and Bhattacharyya in further view of the publication "Fully Integrated 64Kb MRAM with a novel Reference Cell Scheme" to Jeong et al. ("Jeong"). As an initial matter, Applicant submits that Claims 4 and 31 are patentable for at least the reasons discussed above with

reference to Claims 1 and 26 from which they respectively depend. In addition, Applicant submits that Claim 31 is separately patentable over the combination of the cited references. In particular, Claim 31 recites the MRAM of Claim 26, "wherein the plurality of elongated reference magnetic resistors and the plurality of elongated main magnetic resistors each include a pinned layer having magnetic spins that are oriented parallel to one another along the face."

The Office Action states that, in Figure 7, Jeong discloses "to make the structure of a MTJ cell to comprise a pinning layer, pinned layer, tunneling layer, and a free layer". Office Action, Page 4. As shown in Figure 7, Jeong indeed illustrates a layer structure for a MTJ cell, including a pinned layer. However, the cited portion of Jeong does not appear to disclose or suggest pinned layers in main and reference magnetic resistors which have "magnetic spins that are parallel to one another", as recited by Claim 31. In fact, as shown in Figure 7, Jeong appears to contain no reference to the magnetic spins of the respective layers in the illustrated layer structure. Further, the Office Action does not rely on Hidaka, Li, and/or Bhattacharyya to supply such recitations. Accordingly, Applicant submits that Claim 31 is patentable over the cited references for at least the above reasons. In addition, although not explicitly indicated as rejected or allowable in the Office Action, Claim 42 contains similar recitations, and is therefore patentable for reasons similar to those described above with reference to Claim 31.

Also, as noted in the Office Action, Claim 5 is independently patentable, as none of the cited references appear to disclose or suggest main and reference transistors having length directions intersecting at a predetermined nonzero angle "wherein the predetermined nonzero angle is 90°", as recited by Claim 5.

Conclusion

Applicant again appreciates the thorough examination of pending Claims 1-17, 26-37, and 39-46, and the indication that Claims 11-17 are allowed and that Claim 5 is allowable. Applicant has now shown that all of the pending claims meet the statutory requirements for patentability. Accordingly, Applicant respectfully requests withdrawal of the outstanding rejections and allowance of the present application.

Respectfully submitted,

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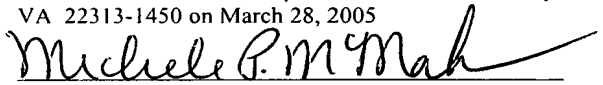

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